

REMARKS/ARGUMENTS

As an initial matter, the present invention is directed to a heat sink structure with embedded electronic components. The heat sink has an upper surface and a lower surface with a plurality of recessed cavities formed on the lower surface. At least one electronic component e.g. active or passive component is embedded in at least one of the recessed cavities of the heat sink and at least one of the other recessed cavities is to receive at least one active component. The present invention is further directed to a semiconductor package. The package comprises a substrate and a heat sink. At least one semiconductor chip is mounted on the substrate and the structure of the heat sink is as described above.

The rejection of claims 1, 3 - 9, and 11 - 14 under 35 U.S.C. § 102(b) as being anticipated by Edwards et al. US 5,819,402 is respectfully traversed. Edwards et al. disclose a method to provide a customized thermally conductive path between at least two semiconductor elements and a thermal cap. The semiconductor elements are secured onto a substrate and the thermal cap is placed over the substrate. As shown in Edwards et al.'s Figure 3 and discussed in column 7, lines 28 - 39, the chips 51, 52, 53, 54 and 55 are secured onto the substrate 10 and a thermal cap 50 with thermal or heat transfer area 62, 64 and 65 is placed over the substrate 10. Thermal conducting paste is between each chip and the customized thermal or heat transfer area. Edwards does not teach or suggest that at least one electronic component is embedded in at least one of recessed cavities of the heat sink and at least one semiconductor chip is received in at least one of the other recessed cavities of the heat sink as defined in the present invention.

The rejection of claims 2 and 10 under 35 U.S.C. § 103(a) as being unpatentable over Edwards et al. in view of Dolbear U.S. 5,907,474 is respectfully traversed. Dolbear discloses a heat transfer apparatus. The thermal conductive cap is secured directly via fasteners to a printing circuit board. In Fig. 6, the cap structure 46 has a hole 72 through which the upper surface of the chip 40 is exposed to the ambient during use. However, Dolbear does not teach that the cap structure has a plurality of cavities, or that the chip and the electronic component are respectively received and embedded in the cap structure.

Therefore, the present invention is novel over Edwards et al. and is not obvious from Edwards et al. in view of Dolbear. No issues remaining, the claims are believed to be in condition for allowance, and a Notice of Allowance is respectfully solicited..

The Commissioner is hereby authorized to charge payment of any fees required associated with this communication or credit any overpayment to Deposit Account No. 50-0337. If an extension of time is required, please consider this a petition therefor and charge any additional fees which may be required to Deposit Account No. 50-0337. A duplicate copy of this paper is enclosed.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Robert Berliner', is written over a horizontal line.

Robert Berliner
Registration No. 20,121

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